Canine Catch-Neuter-Return (CNR) Good Practice Guides

Good aseptic techniques and sterility - Surgical instruments & drapes

Learning Outcomes:
1. Describe how to adequately clean surgical instruments after use
2. Outline the two methods of sterilisation – cold chemical and wet steam
3. Explain how to pack and load surgical kits into autoclaves to ensure they are properly sterilised and the use of indicators.

Bacteria will grow on organic material such as dirt, blood or tissue. Before sterilising surgical equipment, these items must first be cleaned in order to remove this organic material. Immediately after surgery, the veterinary surgeon should discard the scalpel blade and any other sharps into a sharps bin. Then all instruments, including reusable needles, should be cleaned and inspected, and removed from the kit and replaced if blunt, damaged or rusted. Instruments should be checked, sharpened and oiled regulary, and must be cleaned and sterilised between each surgery. Blunt, damaged or non-sterile instruments should not be used.

Cleaning surgical instruments:

Dirty instruments being soaked in enzymatic cleaner

Immediately following surgery, the contaminated surgical instruments should be soaked in fresh, cold water ideally with an enzymatic cleaner such as 'CSI Liquid Instrument Detergent' for 10 minutes to remove blood and tissue. It is essential that all ratchets are opened out so that the disinfectant can penetrate all surfaces. It is important to wear gloves when using an enzymatic cleaner.

Instruments being scrubbed clean with surgical instrument cleaner

Remove the instruments and place them into a separate bowl containing fresh, warm water with an approved surgical instrument cleaner with a neutral pH detergent.
Use a soft plastic cleaning brush to scrub the instruments whilst in the detergent solution. Do not use steel wool, wire brushes or other abrasive materials that could damage the instruments. Pay special attention to instrument hinges, serrated sections, ends and handles to ensure all blood and tissue is removed.

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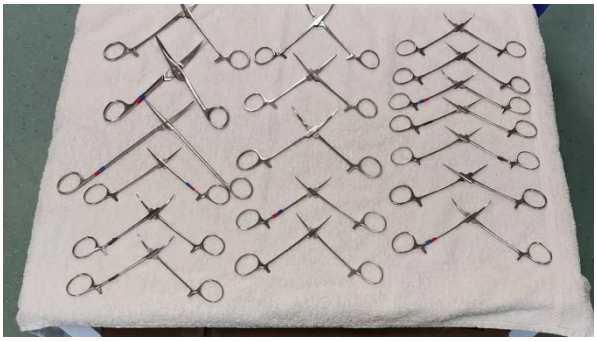

Clean, rinsed instruments with joints open drying on a towel

The instruments must be rinsed thoroughly in cold water to remove all traces of cleaning solution and then laid out on a clean towel with joints open to dry. Use a towel to dry the instruments and then leave them to air dry for a short duration in the clean surgical area where they will be protected from dust until they are completely dry.

Lubricating is recommended for all instruments that have moveable parts (ratchets, hinges, box locks, screw heads, etc.). This should be done after every cleaning to ensure all those parts stay in excellent condition.

The instruments must be clean and dry prior to sterilisation, and should be arranged or 'packed' into appropriate surgical kits. Surgical kits should contain everything that the veterinary surgeon needs to start the neuter surgery. It will include the surgical instruments, drape, cotton gauze swabs and new scalpel blade. A new scalpel blade must be used for each surgery, and if using sterile suture from a cassette, sterile needles must be used. If the blades or needles become blunt during a surgery, replace it with a new sterile blade or needle.

Examples of surgical kit contents:

Large dog spay Kit	
Amount	**Instrument**
2	16 cm Artery forceps
2	12cm Artery forceps
2	10cm Artery forceps
2	13cm Allis tissue forceps
1	14cm Mayo scissor curved
1	Mayo scissors straight
1	Needle holders
1	Rat toothed forcep
1	Plain tissue forcep
1	Size 3 scalpel handle
4	Towel clamps
1	Spey hook (optional)
5	Cotton surgical gauze swabs
1	Size 10 scalpel blade
1	Large fenestrated patient drape

Dog castration or small dog spay kit	
Amount	**Instrument**
2	12cm Artery forceps
2	10cm Artery forceps
2	13cm Allis tissue forceps
1	14cm Mayo scissor curved
1	Mayo scissors straight
1	Needle holders
1	Rat toothed forcep
1	Plain tissue forcep
1	Size 3 scalpel handle
4	Towel clamps
1	Spey hook (optional)
5	Cotton surgical gauze swabs
1	Size 15 scalpel blade
1	Small fenestrated patient drape

The surgical kit can be packaged into fabric drapes or plastic autoclave bags. If using reusable fabric drapes, these must be cleaned prior to sterilisation. Contaminated surgical drapes should be soaked in cold water in order to remove the blood or tissue from the fabric. After they have been soaked for a short period of time, ideally these drapes should be washed in a washing machine with fabric detergent to ensure they are cleaned thoroughly. Once clean and dry, the drapes can be used to wrap around the surgical kits or included in the surgical kit as a patient drape ready to be sterilised. Ideally the kits should be double wrapped if non-sterile hands need to handle the kits to store them, as this maintains the sterility of the inner wrap which only the sterile gloved surgeon will handle.

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Take care not to wrap the kits too tightly to allow steam to penetrate though the kit and kill any bacteria. The kit must be easy to unwrap without risk of dropping or contaminating the instruments. The joints of the instruments must be left open to allow the steam to penetrate and sterilise all surfaces, also the heat from the autoclave causes the instruments to swell slightly which could damage the joints if they are ratcheted closed.

How to wrap a surgical kit in fabric drapes:

1. Lay out a clean, lint free, fabric drape, on a clean work surface. Place a second clean, lint-free, fabric drape (the inner drape) onto the first drape (the outer drape).

2. Place instruments in a neat pile in the centre of the inner drape.

3. Place an indicator strip in the centre of the instruments.

4. Place 5 clean gauze swabs on top of the instruments – gauze swabs may also be wrapped separately.

5. Using the inner drape, wrap the instruments firmly

6.

7.

8.

9.

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10. Wrap the instruments and inner drape firmly with the outer drape

11.

12.

13.

14. Secure the pack with steam autoclave tape

15. Label with pack contents and today's date.

Once the instruments are packed into surgical kits, they must be sterilised. Sterilising surgical instruments is essential to prevent infection and the spread of disease between dogs. The use of autoclaves is recommended for sterilising surgical instruments, drapes and hand towels in catch neuter return (CNR) programmes. Autoclaves use steam sterilisation. The steam destroys microbes by coagulating and denaturing cellular proteins, but there must be a correct relationship between temperature, pressure, and exposure time, in order for all micro-organisms to be destroyed.

There are many different types of autoclaves, and a pressure cooker and generator can work very effectively to sterilise instruments. The instructions must be followed carefully as pressurised autoclaves can be dangerous if used incorrectly.

Pressure cooker and generator

Depending on the type of autoclave and resources available, the surgical kits can be packaged into either plastic autoclave bags, double wrapped as explained earlier or single wrapped in an enclosed autoclave container.

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Surgical kit - single wrap in fabric drape and placed in plastic autoclave bag ready to be put in the autoclave for sterilisation. Once sterile, at the start of the surgery the outer plastic packet must be opened by an assistant and the inside contents only touched by sterile gloved hands to maintain sterility.

Surgical kit - double wrapped in fabric drapes ready to be put in the autoclave for sterilisation. Once sterile, at the start of surgery this can be placed on a dry surgical tray and opened by an assistant, taking care not to touch the inner wrap which must only be handled by sterile gloved hands to maintain sterility.

Surgical kit – single wrap in container, ready to be placed into the autocalve. Once sterile, at the start of surgery, the assistant must open the top of the container and the inner contents can only be touched by sterile gloved hands to maintain sterility.

Always use a sterilisation indicator to ensure the instrument kits have been exposed to 121 degrees Celsius for 30 minutes – the required temperature and time necessary for sterility. For example, 3M comply chemical indicator strips can be used, these change colour from yellow to blue when the temperature reaches 121 degrees Celsius for 15 minutes. Alternatively brown steam autoclave tape can be used, this changes colour from white to brown when 121 degrees Celsius is reached but does not confirm that the autoclave has been at that temperature for the required duration for sterilisation, and so is not a reliable indicator of sterilisation. Ideally both of these indicators should be used, the tape can be used to seal the instrument kits, and a chemical indicator strip should be placed inside each kit or in the middle of the autoclave in every steam cycle to ensure that steam is penetrating effectively, and all kits are being sterilised effectively.

When placing the surgical kits into the autoclave, never stack them on top of one another, instead position the kits standing upright for adequate steam flow, and heavier instruments should be placed at the bottom of autoclave, with lighter ones at the top. Improper wrapping of an instrument kit or overloading of the autoclave with too many kits may result in improper sterilisation.

Autoclaves will vary slightly depending on the type used. Read the instructions carefully to ensure the instrument kits reach the required 121 degrees Celsius for 30 minutes for sterilisation, remember that this does require high pressure and autoclaves can be dangerous if used by inexperienced individuals.

Surgical kits should be allowed to dry and cool before removal from the autoclave. The surgical kits are sterile inside and out once they have been autoclaved and it is important that they remain sterile. If they are touched by anything that is unsterile, like your hands, then they are considered ‘contaminated’ and will have to be re-sterilised.

Store sterile surgical kits in a non-humid, dust free, well ventilated area. Sterile items must be kept dry and should not be folded or torn. If concerned about the sterility of a kit, treat it as contaminated and re-sterilise.

Cold chemical sterilisation

An alternative method of sterilisation is cold chemical sterilisation. Using chemicals as a method of sterilisation is useful when instruments are unable to be autoclaved because of the material they are made from. This may be because the instrument contains plastic, or another material that is not compatible with the conditions required for steam sterilisation.

Cold chemical sterilisation involves the submersion of instruments in a non-corrosive, sterilising solution for a set duration of time. Prior to sterilisation, items must be thoroughly cleaned of all blood and organic matter, which may prevent successful sterilisation, be completely dry to prevent chemical dilution, and have all hinged and ratchets open. After sterilisation, it is vital that instruments are rinsed with sterile saline or sterile water to remove all chemicals before they come in to contact with living tissue.

Glutaraldehyde cold chemical sterilisation

The recommendation for instrument sterilisation is immersion in 2% Glutaraldehyde for 10 hours at 20-25 degrees Celsius. Instruments should be sterilised with hinges open.

Instruments in a container ready to be sterilised in Formahdehyde gas

Alternatively, Formaldehyde gas sterilisation may be used by placing instruments in a container and exposing them to formalin gas for 24 hours.

Cold chemical sterilization is harsh on instruments and will shorten their life. Mistakes in dilution or contamination are common with this method so is not recommended for use for surgical instruments, autoclaves should be used for surgical instruments instead. Formaldehyde gas may present some human health risks, and this should also be considered.

On the right an ET tube with the cuff inflated and cleaning brush inserted. On the left an ET tube in cold chemical sterilisation fluid

Cold chemical sterilisation can be very beneficial for use in sterilising cleaned endotracheal tubes after use to minimise the spread of diseases between dogs.
Ensure any chemical is rinsed from ET tubes prior to use.

Checklist:

- ✓ Instruments must be cleaned thoroughly in neutral pH detergent prior to sterilisation
- ✓ Steam sterilisation in autoclaves is recommended for surgical kits used in CNR programmes
- ✓ Surgical kits must not be wrapped too tightly and not overloaded in the autoclave
- ✓ Use indicators such as chemical indicator strips and autoclave tape to check that surgical kits are exposed to the required 121 degrees Celsius for 30 minutes
- ✓ Sterile surgical kits must only be handled by other sterile items such as sterile surgical gloved hands or sterile forceps, or they will be contaminated.

References:

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